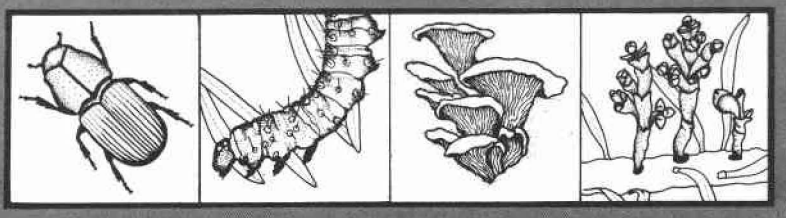
Forest Pest Management



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A DWARF MISTLETOE PROGRAM FOR THE FLATHEAD INDIAN RESERVATION, MONTANA

by

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ABSTRACT

Dwarf mistletoes still pose management problems on the Flathead Reservation. We describe a management program, to be conducted in conjunction with the silvicultural program, which will help reduce the impact of dwarf mistletoe on Douglas-fir, western larch, and lodgepole pine. This program covers fiscal years 1986 through 1990.

FOREST MANAGEMENT BACKGROUND

Dwarf mistletoe infested timber stands on the Flathead Reservation remain a concern; more than one-third of the Douglas-fir, western larch, and lodgepole pine stands have some mistletoe. Presence and severity of infections have a significant effect on management and silvicultural planning.

A simple mistletoe rating system has been devised to place infested stands into four classes. These classes dictate one of two broad management systems, evenaged or unevenaged, and help define silvicultural treatments. They are:

1. Class I - Both overstory and understory have more than one-third of all stems visibly infected. Infested overstory is removed in a clearcut or seed tree regeneration cut and the understory eliminated through logging and subsequent slashing operations. Class I stands commonly occur, occupying an estimated 80,000 acres of the Reservation.

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2. Class II - Overstory has more than one-third of the total stems infected, but the understory has less than one-third of the total stems infected. The prescription provides for overstory removal or the removal of all infected stems and a sanitation thinning in the understory. Class II stands often occur where previous cutting in the overstory was moderate to heavy, which encouraged the presence of seral and/or nonhost species within the understory.

3. Class III - Overstory has less than one-third of the total stems infected and the understory is more than one-third infested or absent. Though not common, this situation exists because of combinations of species within overstory and understory, and host specificity of the mistletoe plants. The overstory is sanitized through logging, and the understory, if present, destroyed, also through logging. Prescriptions here may dictate an evenaged regeneration system (shelterwood) or, if overwood volumes remaining after logging are substantial, an unevenaged prescription. The remaining volume would be removed in successive 15- to 20-year cutting cycles with the purpose of developing an age-diameter distribution over time.

4. Class IV Stands - These stands have a defined understory and overstory and are only lightly infested with dwarf mistletoe (less than one-third of stems infected in either category). Class IV stands will always be targeted for unevenaged management unless other factors such as general decadence, slope, regeneration problems or other insect and disease considerations dictate otherwise. The objective of mistletoe treatment will be to remove all visible infections in the overstory through harvest and in the understory through a Timber Stand Improvement (TSI) followup treatment. The Class IV mistletoe rating is the most commom of the four ratings on the Reservation.

These four classifications presume a merchantable harvest cut. Considerable acreages exist, particularly of Class I stands, where harvestable volumes are extremely low. Treatment of these areas is dependent upon a partial, if not complete, subsidy of the logging operation. This subsidy may take several forms. In the most extreme case, special funds may be set aside to log infested timber. More likely, infected stems will be removed by a contract logger at very low rates with the provision that all subsequent cultural work be funded from other sources and performed by the Tribes or Bureau of Indian Affairs.

STAND RECONNAISSANCE AND STRATIFICATION

During the presale phase of timber sale preparation, management and silvicultural prescriptions are developed through stand examination by the District silviculturists. The presence of mistletoe, as defined earlier, is often a prime consideration in the prescription-making process.

The resolution of information is sufficient to complete environmental analysis and appraisal, and plan postsale timber stand improvement projects, including mistletoe control.

Following logging, those areas selected for mistletoe control are reexamined, a stand-specific cutting prescription prepared, unit boundaries placed on the ground, and the work accomplished. This second examination serves to "fine tune" the thinning and mistletoe control prescription and allows each prescription to account for actual conditions present immediately after logging.

BIOLOGICAL EVALUATION

The Reservation contains 322,000 acres of commercial forest land, of which about 206,000 acres (64 percent) support Douglas-fir, western larch, and lodgepole pine timber types. Dwarf mistletoes (Arceuthobium douglasii on Douglas-fir, A. laricis on western larch, and A. americanum on lodgepole pine) are serious problems on much of the Reservation. Permanent growth plot data show that one of every four host trees is infected with dwarf mistletoe.

The major effect of dwarf mistletoe infection is growth reduction. Some mortality occurs, especially when infected trees are attacked by insects. Heavily infected trees produce smaller cone crops and seeds of lower viability than healthy trees. Wood quality and log grades are adversely affected by stem infections.

Growth impact in the 110 M acres of cutover Douglas-fir and western larch stands is significant. These semi-managed stands have had the most severely infected trees removed in earlier harvests, but permanet growth plots continue to indicate an annual board foot loss of 1.9 MMBF, or 17.3 BF/acre/year (Dooling and Haglund 1980). Annual losses probably exceed this figure for uncut Douglas-fir and western larch and all lodgepole pine stands. A conservative estimate of total growth loss on the Reservation exceeds 3 MMBF per year (Dooling and Haglund 1980).

In areas selectively cut, the objective should be removal of all visible infections in each stand entry. This will reduce the amount of dwarf mistletoe to negligible levels, and little growth loss will result if these trees are removed during the next cutting cycle (15 to 20 years). Major concern is the potential infection of any newly established regeneration during this time period.

Trees left for seed and shelter in evenaged regeneration cuts should also be disease free. Some lightly infected trees may have to be left. This is acceptable if infected trees are removed before regeneration is 3 feet tall or 10 years old, whichever occurs first. This grace period is possible because seedlings present small targets for dwarf mistletoe seed to hit and the likelihood of infection is small.

Treatments will consist of cutting infected nonmerchantable trees during sanitation cuttings, cleanings, and thinnings. Site rehabilitation may require severing all infected trees. These are standard silvicultural practices; if implemented within the guidelines established by the 1981-1990 Forest Management Plan, adverse impacts on other forest resources should be minimized.

Reduction of dwarf mistletoe impact through normal silvicultural practices is biologically sound, but costs are usually higher when dwarf mistletoes must be considered, and additional funding to cover these costs is often required. Within the guidelines covered later in the use of funds section, forest pest management funds should be used to meet these additional costs.

USE OF FOREST PEST MANAGEMENT FUNDS

Forest Service and Bureau of Indian Affairs personnel met in Ronan on November 4, 1985 to discuss the proportionate share of FPM money to BIA Add-on and Tribal money for the dwarf mistletoe program. Suggested levels of FPM funding for different program activities follow.

Presuppression Surveys

Forest Pest Management funds should pay the entire cost in areas not included in sale packages, and in sale areas where additional plots are needed to define more clearly the dwarf mistletoe treatment necessity.

Postsuppression Surveys

Forest Pest Management funds should pay the total cost of these surveys following treatment to determine if the prescription was accurate and if the desired job was done.

Permanent Monitoring

Forest Pest Management funds should fully fund a series of permanent plots in Class IV selectively logged stands. These plots are discussed later.

Suppression Activities

First priority, Class II--Stands with a merchantable overstory removed by a timber sale and with an understory that needs treatment qualify for a maximum of 50 percent FPM funding. Stands with an unmerchantable overstory and an understory that needs treatment qualify for 100 percent FPM funding for overstory removal and a maximum of 50 percent for understory treatment.

Second priority, Class IV--These stands qualify for a maximum of 50 percent FPM funding for understory treatment. Use of FPM funds is limited to two stand entries. If a third treatment is needed, some other action is required, and should not be paid for by FPM funds.

Third priority, Classes I and III--These stands needing rehabilitation qualify for FPM funding as follows:

- where the overstory cannot be sold because of low volumes (0-1,000 BF/acre depending on average tree size and quality) - 100 percent of the cost of falling infected overstory and slashing the understory.

- where a purchaser is required to take the logs only, and the sale can bear only minimal follow-up treatment costs because of low merchantable volumes and values - a maximum of 75 percent of the cost of understory slashing.

Limitation on use of funds--Forest Pest Management funds are for felling infected trees only; all site preparation and planting must be paid for by other funds.

PROGRAM COSTS

Average total cost of mistletoe control work on the Reservation is estimated at $86/acre. Forest Pest Management share was discussed in the preceding section. Cost may vary from year to year. Annual budget estimates will reflect actual costs. In selected areas needing rehabilitation, scattered merchantable tree felling is estimated to cost an additional $24/acre.

The yearly budget request and project proposal will include areas and acres to be treated, the type of treatment (condition classes I to IV), and the proposed funding level for each treatment category.

SCHEDULE OF EVENTS

Federal Pest Control Projects

FY 1986-1990

Sale area	Acres					
	1986	1987	1988	1989	1990	Total
Alder Ditch	56	93	186	130		465
Bassoo		200	330	330		860
Big Knife			66	66		132
Black Lake				66	66	132
Burke Hill			40			40
Camas					330	330
Clear					132	132
Cottonwood					200	200
Deemer Peak			132	132		264
Dog Lake		240	330	330		900
Eva Paul		200	200			400
Ferry Basin			267	267		534
Garceau Gulch	120					120
High Hog		132	200			332
Hog Back		267	267			534
Hog Heaven		66	267	267		600
Hog Wild				132	200	332
Kicking Horse Bull Pine			35			35
Lamoose					265	265
Letzen	200					200
Little Money		66	66			132
Middle Crow		66	66			132
Mill Pocket			132	200	200	532
Mission				200	200	400
Mud Creek				66	66	132
Rattlesnake		66	66			132
Revais					330	330
Saddle					132	132
Seepay				132	132	264
Sloan					67	67
Stevens		267	400	400		1,067
Sullivan		66	132			198
Sunny Slope				132	200	332
Xeric				265	200	465
Yellow Bay				68	468	536
Rehabilitation Sales	200	500	500	500	500	2,200
TOTAL	576	2,229	3,682	3,683	3,688	13,858

SURVEYS

Because dwarf mistletoes are seed-producing plants with a limited spread potential, their occurrence tends to be spotty and concentrated, not random. It is not only important to know where dwarf mistletoes are, but also where they are not. If a significant portion of a stand is dwarf mistletoe-free, management options are broader. Conversely, if the stand is heavily infested, options may be limited to either doing nothing or destroying the stand and starting over.

Knowing the infection intensity is also important. A light infection does not have a measurable impact on tree or stand growth, but a heavy infection can reduce potential volume growth by as much as 86 percent (On and Dooling 1969). Intensity rating systems are used to quantify degree of infection for management priority determinations, to quantify growth loss and mortality, to help define suitable seed trees, and to help quantify infection hazard of overstory trees to understory stands (Hawksworth 1977).

Presuppression surveys determine the need for control and the best method to use; postsuppression surveys determine if the job was done right.

Distribution surveys--The simplest and least expensive survey is one included as part of stand examinations. The number of sample points is necessarily limited, and may give neither the accuracy nor precision required for good management planning. At the other end of the scale is a complete cruise with accurate mapping of all infected trees and infection centers. Either method may be necessary in specific circumstances, but normally something in between these extremes will provide the desired accuracy and precision at a reasonable cost. It should be emphasized, however, that the purpose of a survey is to gather data to help make a treatment or management decision. If that decision is obvious, no further effort should be expended. In most cases, stand examination procedures normally employed will be sufficient.

A good all-around survey system for determining presence and infection intensity of dwarf mistletoe was developed by Walters and Brown (1973) and Brown (1973). They compared three sampling techniques: the compartment examination used in the Rocky Mountain Region, a one percent fixed-plot sample, and third nearest tree sample on 2- and 4-chain grids. An analysis of their data compared to a complete cruise showed that a modified third nearest tree sample using a 4-chain spacing will give acceptable precision at a reasonable cost. The sample point is a variable size plot with a maximum radius of 33 feet. Each plot is divided into four quadrants by the intersection of a base line through the plot center at right angles to the compass line. Quadrants are examined in a clockwise direction around plot center. The modified third nearest tree consists of an examination of only the third nearest host tree from the plot center in each quadrant for a maximum of only four trees per sample point.

Many other survey methods have been used; most of these are covered in Dooling's (1978) review paper.

Infection intensity rating--There have been many attempts to quantify dwarf mistletoe on a tree basis (Hawksworth 1977). Some systems have as few as four classes and one as many as 18. The terms "light," "medium," and "heavy" have been used in many rating systems, but have not been very well defined.

The 6-class dwarf mistletoe rating system, introduced by Hawksworth and Lusher (1956), is now the accepted standard. Hawksworth (1977) has discussed the 6-class system in detail and described its uses and limitations.

LONG-TERM MONITORING

Many Class IV stands on the Reservation have been selectively logged and are managed as unevenaged. It is believed that dwarf mistletoe can be reduced to and maintained below the economic damage threshold if all visibly infected trees are removed at each cut. However, good data are lacking. Permanent monitoring plots in similar stands would determine if the current policy of unevenaged management is workable in infested stands.

Such a permanent monitoring system should be established, but this report is not the place for details. The study should be designed and a plan written soon.

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